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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/421,625	10/19/1999	EUGENE P. MARSH	M122-1284	4404

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WELLS ST. JOHN P.S.  
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SPOKANE, WA 99201

EXAMINER

VU, HUNG K

ART UNIT PAPER NUMBER

2811

DATE MAILED: 09/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/421,625

Applicant(s)

MARSH, EUGENE P.

Examiner

Hung K. Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 97-120 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 97-109 and 117-120 is/are allowed.
- 6) ☒ Claim(s) 110-116 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Request for Continued Examination***

1 A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/26/03 has been entered. An action on the RCE follows.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 110-116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (PN 6,033,953, of record).

Aoki et al. discloses, as shown in Figures 1B-1D, a capacitor comprising,

a substrate (1);

a hemispherical grain platinum layer (upper portion of layer 38) over the substrate, the hemispherical grain platinum layer having a continuous surface characterized by columnar pedestals;

an intervening layer (a lower portion of layer 38 and layer 39) between the hemispherical grain platinum layer and the substrate.

Aoki et al. does not teach exact the average diameter of the hemispherical grain platinum layer, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the hemispherical grain platinum layer of Aoki et al. having a desired average diameter, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With regard to claim 111, Aoki et al. discloses the intervening layer (lower portion layer 38) comprises platinum. Note Figures 1B-1D of Aoki et al..

With regard to claim 113, Aoki et al. discloses the substrate comprises monocrystalline silicon.

With regard to claims 114 and 115, although Aoki et al. does not teach exact the height of columnar pedestals and the average diameter of the columnar pedestals, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the hemispherical grain platinum layer platinum layer and the columnar pedestals of Aoki et al. having a desired height and average diameter, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

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With regard to claim 116, Aoki et al. discloses, as shown in Figures 1B-1D, a capacitor comprising,

a first capacitor electrode (38) over a monocrystalline silicon substrate (1);

a second capacitor electrode (37);

a dielectric layer (40) between the first and second capacitor electrodes;

wherein at least one of the first and second capacitor electrodes comprise hemispherical grain platinum having a continuous surface characterized by columnar pedestals having heights greater than or equal to about one-third of a total thickness of the platinum. Note that Figures 1B-1D show columnar pedestals having heights greater than or equal to about one-third of a total thickness of the roughened platinum.

Aoki et al. do not teach exact the average diameter of the columnar pedestals, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the columnar pedestals of Aoki et al. having a desired average diameter, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

3. Claim 112 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (PN 6,033,953, of record) in view of Kingon et al. (PN 5,555,486, of record).

Aoki et al. discloses the invention substantially as claimed including the integrated circuit as recited in the rejection above. Aoki et al. further discloses the intervening layer comprising titanium nitride. Note Col. 4, lines 7-9 of Aoki et al.. Aoki et al. does not disclose the

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intervening layer comprising at least one of  $\text{IrO}_2$ ,  $\text{RuO}_2$ ,  $\text{RhO}_2$ , or  $\text{OsO}_2$ . However, Kingon et al. discloses an intervening layer (22), formed under a platinum layer (23), comprising at least one of  $\text{IrO}_2$ ,  $\text{RuO}_2$ ,  $\text{RhO}_2$ , or  $\text{OsO}_2$ . Note Col. 5, lines 15-25 and Figure 1a of Kingon et al..

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the intervening layer of Aoki et al. comprising at least one of  $\text{IrO}_2$ ,  $\text{RuO}_2$ ,  $\text{RhO}_2$ , or  $\text{OsO}_2$ , such as taught by Kingon et al. in order to improve the capacitor performance both in terms of fatigue and leakage current.

4. Claims 110-116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura (PN 6,232,629, of record).

Nakamura discloses, as shown in Figures 2, 3A, 7 – 10D, and 24 – 32, a capacitor comprising,  
a substrate (12);

a hemispherical grain platinum layer (112) over the substrate, the hemispherical grain platinum layer having a continuous surface characterized by columnar pedestals;

an intervening layer (111) between the hemispherical grain platinum layer and the substrate,

Nakamura does not teach exact the average diameter of the hemispherical grain platinum layer, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the hemispherical grain platinum layer of Nakamura having a desired average diameter, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

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With regard to claim 111, Nakamura discloses the intervening layer (a lower portion of layer 112) comprises platinum. Note Figures 1B-1D of Aoki et al..

With regard to claim 112, Nakamura discloses the intervening layer the intervening layer comprising at least one of  $\text{IrO}_2$ ,  $\text{RuO}_2$ ,  $\text{RhO}_2$ , or  $\text{OsO}_2$ .

With regard to claim 113, Nakamura discloses the substrate comprises monocrystalline silicon.

With regard to claims 114 and 115, although Nakamura does not teach exact the height of columnar pedestals and the average diameter of the columnar pedestals, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the hemispherical grain platinum layer platinum layer and the columnar pedestals of Nakamura having a desired height and a desired average diameter, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

With regard to claim 116, Nakamura discloses, as shown in Figures 2, 8 and 26, a capacitor comprising,

- a first capacitor electrode (32) over a monocrystalline silicon substrate (102);

- a second capacitor electrode (35);

- a dielectric layer (8) between the first and second capacitor electrodes;

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wherein at least one of the first and second capacitor electrodes comprises hemispherical grain platinum having a continuous surface characterized by columnar pedestals having heights greater than or equal to about one-third of a total thickness of the platinum. Note that Figures 2, 8 and 26 show columnar pedestals having heights greater than or equal to about one-third of a total thickness of the roughened platinum.

Nakamura does not teach exact the average diameter of the columnar pedestals, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the columnar pedestals of Nakamura having a desired average diameter, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

***Allowable Subject Matter***

5. Claims 97-109 and 117-120 are allowed.

6. The following is an examiner's statement of reasons for allowance:

Applicant's claims 97-109 and 117-120 are allowable over the references of record because none of these references disclose or can be combined to yield the claimed hemispherical grain platinum formed by a process having all the limitations, as recited in claim 97, and the hemispherical grain platinum alloy layer comprising platinum and at least one of rhodium, iridium, ruthenium, palladium, osmium or silver, disposed over the first layer comprising at least one of iridium, rhodium, ruthenium, palladium, osmium, silver, alloy, IrO<sub>2</sub>, RuO<sub>2</sub>, RhO<sub>2</sub>, or



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OsO<sub>2</sub>, the platinum alloy layer comprising columnar pedestal structures having heights greater than or equal to about one-third of a total thickness of the platinum alloy layer and having an average diameter of at least about 200 Å, as recited in claim 117.

### ***Response to Arguments***

7. Applicant's arguments filed 06/23/03 have been fully considered but they are not persuasive.

It is argued, at page 8 of the Remarks, that none of the references discloses the hemispherical grain platinum, as recited in claims 110-116. This argument is not convincing because Aoki et al. discloses, as shown in Figures 1B-1D, a hemispherical grain platinum layer (upper portion of layer 38), and Nakamura discloses, as shown in Figures 2, 3A, 7 – 10D, and 24 – 32, a hemispherical grain platinum layer (112). Therefore, Applicant's claims 110-116 do not distinguish over the Aoki et al. and Nakamura references.

### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 6:00-3:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the

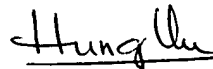
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organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

September 8, 2003

A handwritten signature in cursive script, appearing to read "Hung Vu", written over a horizontal line.

Hung Vu

Patent Examiner